# HIV Surveillance Report | Supplemental Report

# Estimated HIV Incidence in the United States, 2007–2010

CDC

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Data are presented for incidence of HIV infection among adults and adolescents aged 13 years and older based on data on diagnoses of HIV infection reported to CDC through June 2011.

**Suggested citation**

**On the Web:** http://www.cdc.gov/hiv/topics/surveillance/resources/reports/#supplemental

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# Contents

# Commentary

All states and U.S. territories report demographic, behavioral, clinical, and laboratory data on persons diagnosed with HIV infection to the Centers for Disease Control and Prevention's (CDC) National HIV Surveillance System (NHSS). These data are used to estimate the number of persons newly diagnosed with HIV infection (regardless of the stage of disease at diagnosis) and the number of people living with a diagnosis of HIV infection. However, because HIV diagnosis can occur at any point during the long latency between infection and symptom development in HIV disease, and depends on HIV testing and reporting practices, these estimates may not reflect new infections.

As an integrated component of the NHSS, HIV incidence surveillance incorporates into routine case surveillance the collection of data on HIV testing and antiretroviral use history and results from the serologic testing algorithm for recent HIV seroconversion (STARHS) in the states and cities that conduct HIV incidence surveillance[*]. These data are used to generate annual estimates of the number of new HIV infections, including those diagnosed (new HIV infections in the period of interest among persons who had an HIV test during the period and became aware of their infection) and undiagnosed (new HIV infections in the period of interest among persons who were not yet aware of their infection). In contrast to HIV diagnoses (which can occur at any point after HIV infection), HIV incidence (the total number of diagnosed and undiagnosed HIV infections in a single year) reflects the leading edge of HIV transmission, HIV infection trends, and the impact of HIV prevention efforts.

Previously published estimates of HIV incidence demonstrated that HIV incidence had remained stable at approximately 50,000 new HIV infections per year

since the early 2000s [1]. In 2011, published incidence estimates from the NHSS confirmed this overall stability in the years 2006–2009. However, significant increases were noted among young men who have sex with men (MSM) aged 13–29 years, especially young black/African American MSM [2]. This HIV surveillance supplemental report differs from that 2011 publication in that it provides updated estimates of the incidence of HIV infection for the years 2007–2009 and initial estimates for 2010. The updated estimates reflect the dynamic nature of surveillance data, including de-duplication of HIV cases reported across states—which typically leads to lowered estimates of diagnoses and incidence—and the inclusion of data from two additional states (Massachusetts and California; data were available from these areas for the period 2007–2010). Additional differences from previous HIV incidence analyses include revised stratification of incidence of HIV infection by age (includes estimates for the 13–24 year age group with 10-year age groups up to 55 years of age as opposed to 13–29 years followed by 10-year age groups) and cross-tabulation of estimates of HIV incidence by transmission category and sex.

Using a complex mathematical model (known as the Stratified Extrapolation Approach) [1–3], the incidence of HIV infection is estimated by determining the probability that an individual would have an HIV test during his or her period of recent infection (see Technical Notes), then assigning a weight (the inverse of the probability of having an HIV test within the recency period) to each case deemed recent on a test of recent infection. The incidence of HIV infection (whether diagnosed or not) is thus the sum of the weighted number of infections deemed recent. In the United States, data to estimate HIV incidence are only available from a limited number of HIV surveillance areas. HIV incidence estimates are extrapolated from areas contributing data for HIV incidence estimation (for 2007–2010, 18 states, including 4 cities/counties with separately administered HIV surveillance systems, and 2 cities within states that do not conduct HIV incidence surveillance, which comprised 24 of the 25 areas conducting HIV incidence surveillance) to the rest of the United States. Extrapolation was

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[*] 18 states (including 4 cities/counties with separately administered HIV surveillance systems): Alabama, Arizona, California (including Los Angeles County and San Francisco), Colorado, Connecticut, Florida, Indiana, Louisiana, Massachusetts, Michigan, Mississippi, New Jersey, New York (including New York City), North Carolina, Texas (including Houston), Virginia, and Washington; 2 cities within states that do not conduct HIV incidence surveillance: Chicago, Illinois and Philadelphia, Pennsylvania; and the District of Columbia.

conducted by applying the ratio of the estimated incidence of HIV infection to the estimated number of diagnoses of HIV infection in a given year within the areas that did contribute data for incidence estimation to the estimated number of diagnoses of HIV infection in the areas that did *not* contribute data.

A four-year analysis period was chosen in order maximize the number of HIV surveillance areas contributing data for the HIV incidence estimate while allowing for a description of trends. However, four-year trends can be influenced by short-term changes in data, and should be interpreted within the context of longer-term trends. For example, the estimated number of new HIV infections in 2007 was high relative to the preceding and following years, therefore analyses of changes in incidence for this report are limited to comparison of 2008, 2009, and 2010 incidence estimates. Additional annual estimates are needed to substantiate the short-term trends seen in this report.

Comparing 2008 to 2010, the estimated incidence of HIV infection remained stable overall, however, there were some notable differences in HIV incidence by subgroup. HIV incidence decreased among women, primarily black/African American women and women with HIV infection associated with heterosexual contact, but increased among MSM overall, and most notably among the youngest MSM, aged 13–24 years (note that the youngest age group characterized is different from previous reports). Comparing incidence estimates for 2008 and 2010, the number of new HIV infections among each race/ethnicity group of young MSM increased, but the differences were not statistically significant. Young black/African American MSM accounted for more than half of new infections among MSM aged 13–24 years. Overall, blacks/African Americans and MSM continue to bear a disproportionate burden of new HIV infections.

## REPORT FORMAT

*HIV Surveillance Supplemental Report: Estimated HIV Incidence in the United States, 2007–2010* presents data tables that are organized into two main sections:

1. Estimated incidence of HIV infection among adults and adolescents (Tables 1–5)

2. Source data for HIV incidence estimation (Tables 6–7)

The first section presents trends in the estimated number and rate of new HIV infections and corresponding ninety-five percent confidence intervals (95% CI) among adults and adolescents (i.e., persons aged 13 years or older) in the United States from 2007 through 2010. Tables present the number and rate of new HIV infections overall stratified by sex, race/ethnicity, age, and transmission category among males and females, and present stratified data for the three largest race/ethnicity groups. Additional stratifications for small race/ethnicity groups are not presented due to instability of estimates resulting from small numbers of diagnoses and limited data on HIV testing and antiretroviral use history and recency of HIV infection. To reflect model uncertainty, incidence estimates are rounded to the nearest hundred for estimates over 1,000, and to the nearest ten for estimates below 1,000. The second section presents the source data on STARHS (which currently uses the BED HIV-1 capture enzyme immunoassay [BED] as part of the algorithm to determine recency of HIV infection [4–6]) and HIV testing and antiretroviral use history on which these estimates were based.

Readers are encouraged to read all titles and footnotes carefully to ensure a complete understanding of the data presented. The Technical Notes provide additional details on incidence data collection and estimation methods.

## HIGHLIGHTS OF ANALYSES

All rates are per 100,000 population. The report describes comparisons of 2008 to 2010 estimates. The standard for determining a change in estimated numbers of new HIV infections is based on an increase or decrease comparing 2008 to 2010 that is statistically significant at the 0.05 level using the z-test. Important findings related to 2010 estimates are noted. Comparisons that are not statistically significantly different are described as "stable," including some changes that appear large but are not statistically significant.

### Estimated Incidence of HIV Infection among Adults and Adolescents in the United States

- **Overall: The estimated number of new HIV infections remained stable.** Comparing 2008 to 2010, the number of new HIV infections remained stable, with 47,500 (95% CI: 42,000–53,000) new infections in 2008 and 47,500 (95% CI: 42,000–

53,000) in 2010. The rate of new HIV infections in 2010 was 18.8 per 100,000 (Table 1).

- **Age at infection: The estimated number of new HIV infections remained stable in all age groups.** Comparing 2008 to 2010, the number of new HIV infections remained stable in every age group. In 2010, the number of new HIV infections was highest among individuals aged 25–34 years (31%, 14,500 [95% CI: 12,500–16,400]), followed by individuals aged 13–24 years (26%, 12,200 [95% CI: 10,500–13,800]). In 2010, the highest rate occurred among individuals aged 25–34 years (34.9), followed by individuals aged 35–44 years (27.3). Individuals aged 55 years and older had the lowest rate (3.3) (Table 1).

- **Race/ethnicity: Blacks/African Americans continue to be disproportionately affected by HIV infection.** Comparing 2008 to 2010, the number of new HIV infections remained stable in all race/ethnicity groups. In 2010, blacks/African Americans accounted for 44% of the new HIV infections, followed by whites (31%) and Hispanics/Latinos (21%) (Table 1).

- **Sex: The estimated number of new HIV infections decreased among females.** Comparing 2008 to 2010, the number of new HIV infections among females decreased 21%, from 12,000 (95% CI: 10,100–13,900) in 2008 to 9,500 (95% CI: 8,100–10,900) in 2010. In 2010, the rate of new HIV infections among males (30.7) was 4.2 times that of females (7.3) (Table 1).

- **Transmission category: The estimated number of new HIV infections among males with infection attributed to male-to-male sexual contact (men who have sex with men [MSM]) increased; the estimated number of new HIV infections among females with infection attributed to heterosexual contact decreased. Men who have sex with men continue to bear the heaviest burden of HIV.** Comparing 2008 to 2010, the number of new HIV infections among MSM increased 12%, from 26,700 (95% CI: 23,400–30,000) in 2008 to 29,800 (95% CI: 26,200–33,500) in 2010. The number of new HIV infections decreased among females with infection attributed to heterosexual contact by 18%, from 9,800 (95% CI: 8,200–11,400) in 2008 to 8,000 (95% CI: 6,700–9,200) in 2010. In 2010, the majority of new HIV infections was attributed to

male-to-male sexual contact (63% overall and 78% among males). Among females, the largest percentage of new HIV infections was attributed to heterosexual contact (84%) (Table 1).

## Blacks/African Americans

- **Overall: The estimated rate of new HIV infections among blacks/African Americans continues to be greater than the rate among whites.** In 2010, blacks/African Americans comprised 44% of new HIV infections. The rate of new HIV infections in blacks/African Americans (68.9) was 7.9 times as high as the rate in whites (8.7) (Table 1), and the rate of new HIV infections among black/African American males (103.6) was 2.7 times the rate for black/African American females (38.1) (Table 2). In 2010, of all new HIV infections among blacks/African Americans, 51% were among MSM and 38% were attributed to heterosexual contact (Table 2).

- **Black/African American Males: Among black/African American males, the estimated number of new HIV infections was stable. Black/African American males are disproportionately affected by HIV infection.** Comparing 2008 to 2010, the number of new HIV infections among black/African American males was stable at 14,400 (95% CI: 12,400–16,400) in 2008 and 14,700 (95% CI: 12,600–16,900) in 2010. By age at infection, the largest percentage (38%) of new HIV infections among black/African American males in 2010 occurred in those aged 13–24 years (Table 2); this percentage was higher than the percentage for the same group of Hispanic/Latino males (25%) (Table 3) and of white males (16%) (Table 4). In 2010, males comprised 70% of the new HIV infections among blacks/African Americans, and the majority (72%) of new HIV infections among black/African American males was attributed to male-to-male sexual contact. In 2010 the rate of new HIV infections for black/African American males (103.6) (Table 2) was 6.6 times the rate for white males (15.8) (Table 4).

- **Black/African American Females: Although the estimated number of new HIV infections among black/African American females decreased, black/African American females continue to be disproportionately affected by HIV infection.**

Comparing 2008 to 2010, the number of new HIV infections among black/African American females decreased 21% from 7,700 (95% CI: 6,300–9,000) in 2008 to 6,100 (95% CI: 5,100–7,200) in 2010 (Table 2). The number of new HIV infections among black/African American females with infection attributed to heterosexual contact decreased 18% from 6,500 (95% CI: 5,300–7,700) in 2008 to 5,300 (95% CI: 4,400–6,200) in 2010. In 2010, 87% of black/African American females newly infected with HIV had infections attributed to heterosexual contact. The rate of new HIV infections for black/African American females (38.1) (Table 2) was 20.1 times the rate for white females (1.9) (Table 4).

## Hispanics/Latinos

- **Overall: Disparities persist in the estimated rate of new HIV infections in Hispanics/Latinos.** In 2010, Hispanics/Latinos comprised 21% of the new HIV infections. The rate of new HIV infections for Hispanics/Latinos (27.5) was 3.1 times the rate for whites (8.7) (Table 1), and the rate of new HIV infections for Hispanic/Latino males (45.5) was 5.7 times the rate for Hispanic/Latino females (8.0). In 2010, of all new HIV infections among Hispanics/Latinos, 68% were among MSM and 20% were attributed to heterosexual contact (Table 3).

- **Hispanic/Latino Males: The estimated number of new HIV infections in Hispanic/Latino males remained stable. Most new HIV infections were attributed to male-to-male sexual contact.** Comparing 2008 to 2010, the number of new HIV infections among Hispanic/Latino males remained stable at 7,500 (95% CI: 6,200–8,700) in 2008 and 8,500 (95% CI: 7,000–9,900) in 2010, and was stable in all age and transmission category groups. In 2010, Hispanic/Latino males comprised 87% of the new HIV infections among all Hispanics/Latinos and the majority of new HIV infections (79%) among Hispanic/Latino males was attributed to male-to-male sexual contact. The rate of new HIV infections for Hispanic males (45.5) (Table 3) was 2.9 times that for white males (15.8) (Table 4).

- **Hispanic/Latino Females: The estimated number of new HIV infections among Hispanic/Latino females remained stable; Hispanic/Latino females continue to be disproportion-**ately affected by HIV infection. Comparing 2008 to 2010, the number of new HIV infections among Hispanic/Latino females remained stable overall at 1,600 (95% CI: 1,200–2,100) in 2008 and 1,400 (95% CI: 980–1,800) in 2010, and was stable in all age and transmission category groups. The rate of new HIV infections for Hispanic/Latino females (8.0) (Table 3) was 4.2 times that for white females (1.9) (Table 4); most new HIV infections among Hispanic/Latino females (86%) were attributed to heterosexual contact (Table 3).

## Whites

- **Overall: The estimated rate of new HIV infections for white males was higher than the estimated rate of new HIV infections for white females. The majority of new HIV infections among whites overall was attributed to male-to-male sexual contact.** In 2010, whites accounted for 31% of the new HIV infections (Table 1), and the estimated rate of new HIV infections for white males (15.8) was 8.3 times the rate for white females (1.9). In 2010, of all new HIV infections among whites, 75% were among MSM and 13% were attributed to heterosexual contact (Table 4).

- **White males: The estimated number of new HIV infections among white males was stable.** Comparing 2008 to 2010, the number of new HIV infections among white males was stable at 11,800 (95% CI: 10,100–13,400) in 2008 and 13,200 (95% CI: 11,300–15,100) in 2010, and was stable in all age and transmission category groups. In 2010, white males comprised 89% of the new HIV infections among all whites and the majority of new HIV infections (85%) among white males was attributed to male-to-male sexual contact (Table 4).

- **White females: The estimated number of new HIV infections among white females was stable.** Comparing 2008 to 2010, the number of new HIV infections among white females remained stable at 2,300 (95% CI: 1,700–2,800) in 2008 and 1,700 (95% CI: 1,200–2,200) in 2010, and was stable in all age and transmission category groups. In 2010, the majority of new HIV infections among white females (76%) was attributed to heterosexual contact (Table 4).

## Men Who Have Sex with Men

- **Overall: Among men who have sex with men (MSM), the estimated number of new HIV infections increased overall and among MSM aged 13–24 years. MSM remain the population most heavily affected by HIV infection.** Comparing 2008 to 2010, the number of new HIV infections among MSM increased 12% from 26,700 (95% CI: 23,400–30,000) in 2008 to 29,800 (95% CI: 26,200–33,500) in 2010, with a 22% increase among MSM aged 13–24 years from 7,200 (95% CI: 6,100–8,300) in 2008 to 8,800 (95% CI: 7,500–10,100) in 2010 (Table 5). Although MSM represent about 4% of the male population in the United States [7], in 2010 MSM accounted for 78% of the new HIV infections among males (Table 1).

- **Race/ethnicity and age group: The estimated number of new HIV infections was greatest among young black/African American MSM in the youngest age group (aged 13–24 years).** The greatest number of new HIV infections among MSM occurred in young black/African American MSM aged 13–24 years (4,800 [95% CI: 4,000–5,700]). Young black/African American MSM accounted for 45% of new HIV infections among black/African American MSM and 55% of new HIV infections among young MSM overall (Table 5). Comparing incidence estimates for 2008 and 2010, though the number of new HIV infections among young MSM increased significantly overall, despite apparent increases in each race/ethnicity group of young MSM, the differences were not statistically significant.

## SUGGESTED READINGS

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# Technical Notes

## HIV Incidence Surveillance

All states and U.S. territories report diagnoses of HIV infection to the National HIV Surveillance System (NHSS). As an integrated component of NHSS, HIV incidence surveillance includes the collection of HIV testing and antiretroviral use history and STARHS results to determine recency of infection [4] from all newly diagnosed individuals aged 13 years or older. Currently, HIV incidence surveillance is conducted in 18 states (including 4 cities/counties with separately administered HIV surveillance systems), 2 cities within states that do not conduct HIV incidence surveillance, and the District of Columbia.

HIV testing and antiretroviral use history data are collected for all cases newly diagnosed with HIV infection, regardless of stage of disease at diagnosis [8]; however, specimens from persons with HIV infection, stage 3 (AIDS) at the time of diagnosis with HIV infection are excluded from testing for recent infection. HIV testing and antiretroviral use history data include information on prior HIV testing dates, HIV testing frequency, and use of antiretroviral medications. This information can be obtained from patient interviews, medical record reviews, provider reports, records of partner services, and laboratory reports of HIV-related tests to health departments.

STARHS is a two-test algorithm performed on specimens from individuals confirmed HIV-positive using a standard diagnostic algorithm. The first test in the STARHS sequence is used to confirm that the individual is HIV-positive on a standard enzyme-linked immunoassay (EIA) test, and the second test—currently the BED [5–6]—determines whether the individual was diagnosed during his or her period of recent infection. The period of recent infection using the BED is defined as the period after HIV seroconversion but before the concentration of HIV-specific antibodies relative to the overall concentration of antibodies for an individual has reached a level predetermined to define the end of the recency period. On average this period lasts 162 days [6]. HIV incidence surveillance collaborates with public and private/commercial laboratories to locate, determine the disposition of, and ship remnant diagnostic blood specimens for testing using STARHS at a designated laboratory funded by CDC.

The percentage of cases with a STARHS result reported to NHSS varied by surveillance area throughout the analysis period, a result of logistical challenges in obtaining remnant HIV-positive blood specimens for use in STARHS. In order to observe temporal trends in incidence from 2007 through 2010, this analysis includes only those surveillance areas that met the minimum criteria of 15% annual STARHS result completeness, confidential name-based HIV infection reporting, and continuous implementation of HIV incidence surveillance for each year during the analysis period. Surveillance areas meeting these criteria included 18 states (Alabama, Arizona, California, Colorado, Connecticut, Florida, Indiana, Louisiana, Massachusetts, Michigan, Mississippi, New Jersey, New York, North Carolina, South Carolina, Texas, Virginia, and Washington), which included 4 cities/counties with separately administered HIV surveillance programs (Houston, Los Angeles County, New York City, and San Francisco), and 2 cities (Chicago and Philadelphia) within states that do not conduct HIV incidence surveillance. These surveillance areas represented approximately 72% of all cases of HIV diagnosed in the United States in 2007 and 2008 and 73% in 2009 and 2010.

Among cases not diagnosed with stage 3 (AIDS) within 6 months of HIV diagnosis, the overall percentage of cases reported with STARHS results from the 18 states and 2 cities was 34% in 2007, 43% in 2008, 49% in 2009, and 47% in 2010 (Table 6). Completeness by surveillance area ranged from 20% to 64% in 2007, 27% to 70% in 2008, 28% to 75% in 2009, and 25% to 81% in 2010. Among all cases diagnosed with HIV infection from these surveillance areas, the overall percentage of cases with HIV testing and antiretroviral use history information was 43% in 2007, 48% in 2008, 56% in 2009, and 57% in 2010 (Table 7). HIV testing and antiretroviral use completeness by surveillance area ranged from 20% to 83% in 2007, 35% to 80% in 2008, 42% to 86% in 2009, and 39% to 91% in 2010.

## Multiple Imputation

Because a substantial percentage of diagnoses of HIV infection are reported to CDC without HIV testing and antiretroviral use history data and/or BED results, multiple imputation is used to assign values for the missing data for these cases. Multiple imputation is a statistical approach in which each missing value is replaced with a set of plausible values that represent the uncertainty about the true, but missing, value. The plausible values are analyzed using standard statistical procedures and the results from these analyses are then combined to produce the final results [9]. Multiple imputation for HIV incidence estimation takes into account differences in missing data due to sex, race/ethnicity, age at diagnosis, HIV transmission category, geographic region, the size of the metropolitan statistical area (≥500,000; 50,000–499,999; or <50,000 population), disease status at diagnosis, testing group (defined by whether the individual had a negative HIV test before the first positive HIV test or was tested positive on his/her first HIV test), STARHS result, and the type of facility where diagnosis was made. Furthermore, for cases with evidence of a negative HIV test before their positive HIV test (i.e., repeat testers), but missing the negative test date, and for cases with imputed data classifying them as a repeat tester, a multinomial distribution is used to impute the missing inter-test interval (time from last negative HIV test to the first positive HIV test) within strata determined by sex and age at diagnosis.

## TABULATION AND PRESENTATION OF DATA

The estimates in this report are provisional based on HIV surveillance data reported to CDC through June 2011 and HIV incidence surveillance data reported to CDC through December 2011. Estimates are updated annually as additional data are reported to CDC. The data are organized into two sections:

- Section 1 (Tables 1–5): numbers, percentages, and rates of estimated incidence of HIV infection among persons aged 13 years and older, extrapolated from 18 states and 2 cities to the United States, with associated 95% confidence intervals for numbers and rates.
- Section 2 (Tables 6–7): source data for HIV incidence estimation including raw and imputed data on HIV testing and antiretroviral use history and BED results.

## Age

The designation "adults and adolescents" refers to persons aged 13 years and older. For presentations of data on the estimated incidence of HIV infection (Tables 1–5), the age-group assignment (or the age designation) is based on the age at infection, calculated based on the age at diagnosis and STARHS result. For tables that present STARHS and HIV testing and antiretroviral use history data (Tables 6–7), the age-group assignment (for example, 13–24 years) is based on the person's age at the time of diagnosis of HIV infection.

## Race and Ethnicity

In the *Federal Register* for October 30, 1997 [10], the Office of Management and Budget (OMB) announced the Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity. Implementation by January 1, 2003, was mandated. At a minimum, data on the following racial categories should be collected:

- American Indian or Alaska Native
- Asian
- black or African American
- Native Hawaiian or other Pacific Islander
- white

Additionally, systems must be able to retain information when multiple racial categories are reported. In addition to data on race, data on two categories of ethnicity should be collected:

- Hispanic or Latino
- not Hispanic or Latino

This report also presents estimates of HIV incidence for persons in multiple racial categories.

## Transmission Categories

*Transmission category* is the term for the classification of cases that summarizes a person's possible HIV risk factors; the summary classification results from selecting, from the presumed hierarchical order of probability, the one risk factor most likely to have been responsible for transmission. For surveillance purposes, a diagnosis of HIV infection is counted only once in the hierarchy of transmission categories. Persons with more than one reported risk factor for HIV infection are classified in the transmission category listed first in the hierarchy. The exception is men who report sexual contact with

other men *and* injection drug use; this group makes up a separate transmission category.

Persons whose transmission category is classified as male-to-male sexual contact include men who have ever had sexual contact with other men (i.e., homosexual contact) and men who have ever had sexual contact with both men and women (i.e., bisexual contact). Persons whose transmission category is classified as heterosexual contact are persons who report specific heterosexual contact with a person known to have, or to be at high risk for, HIV infection (e.g., an injection drug user).

Cases in persons with no reported risk factor for HIV infection listed in the hierarchy of transmission categories are classified as "no risk factor reported or identified." No identified risk factor cases include cases that are being followed up by local health department officials; cases in persons whose risk-factor information is missing because they died, declined to be interviewed, or were lost to follow-up; and cases in persons who were interviewed or for whom other follow-up information was available but for whom no risk factor was identified.

Because a substantial percentage of cases of HIV infection are reported to CDC without an identified risk factor, multiple imputation is used to assign a transmission category for these cases [11].

## Reporting Delays

Reporting delays (time between diagnosis and the reporting of diagnosis to CDC) may differ across demographic and geographic categories; for some categories delays in reporting have been as long as several years. The statistical adjustment of the data on diagnoses is based on estimates of reporting-delay distributions, which are calculated by using a modified semiparametric life-table statistical procedure. This procedure takes into account differences in reporting delays due to sex, race/ethnicity, and HIV transmission categories; reporting city, state, or territory; geographic region; the size of the MSA; and the type of facility where the diagnosis was made. In addition, this method accounts for changes in the patterns of reporting delays over time as well as reporting delays of more than five years [12]. HIV incidence estimates are based on adjusted data on diagnoses of HIV infection.

## Rates

Rates per 100,000 population were calculated for the estimated incidence of HIV infection. The population denominators used for calculating age-, sex-, and race/ethnicity-specific rates for the 50 states and the District of Columbia were based on the official post-census estimates for 2009 from the U.S. Census Bureau [13]. Each rate was calculated by dividing the estimated total number of HIV infections for the calendar year by the population for that calendar year and then multiplying the number by 100,000.

## INCIDENCE ESTIMATION

### Data Available for Incidence Estimation

**BED Results:** The availability of BED results for persons diagnosed with HIV infection from 18 states and 2 cities that contributed data for analysis (as described previously) varied by year of HIV diagnosis, demographic characteristics, and transmission category. Overall, the percentage of individuals with AIDS diagnosed within 6 months of HIV infection was 31% in 2007 and 2008, and 30% in 2009 and 2010. Of those without a diagnosis of AIDS within 6 months after HIV diagnosis, the percentage classified as recent, after imputation, was 33% in 2007, 32% in 2008, 32% in 2009, and 33% in 2010 (Table 6).

**HIV testing and antiretroviral use history information:** The HIV testing and antiretroviral use history information used in the incidence estimation model to classify persons into a testing group, based on whether they had a previous HIV-negative test, is presented in Table 7. Overall, the percentage of persons classified as repeat testers (those with a negative HIV test before the first positive HIV test) was essentially stable across years at 60% in 2007, 62% in 2008, 61% in 2009, and 62% in 2010. Among repeat testers, after imputation, the percentage with an amount of time between their previous HIV-negative test and diagnosis of HIV infection (the inter-test interval; $T$) less than or equal to 12 months was 40% in 2007, and 42% in 2008, 2009, and 2010.

### Model

The Stratified Extrapolation Approach (SEA) is the statistical model used to estimate the annual HIV incidence at the national level. In the SEA, the total new diagnoses of HIV infection in a single year are grouped

into 83 different strata based on sex, race/ethnicity, age at infection, and transmission category. Within each stratum, HIV incidence is estimated as the number of new HIV diagnoses classified as recent infections using STARHS, divided by the estimated probability that a new infection in the same stratum would be diagnosed within the STARHS recency period (and thus classified as a recent infection). The probabilities of being detected in the STARHS recency period are calculated separately for new testers (i.e., those whose first HIV test was positive) and repeat testers. After stratum-specific incidence estimates are adjusted for reporting delay, the total incidence in the population is the sum of the incidences for all strata [1–3]. Ninety-five percent confidence intervals for HIV incidence estimates are based on the standard deviation calculated using the delta method. The standard deviation incorporates uncertainties related to the annualized recency period, multiple imputation, the inter-test interval, the proportion cases with a diagnosis of stage 3 (AIDS) in the same calendar month as the diagnosis of HIV infection, and reporting delay and extrapolation weights. Confidence intervals reflect random variability affecting model uncertainty but may not reflect model-assumption uncertainty; thus, they should be interpreted with caution.

## Extrapolation

Because not all states conduct HIV incidence surveillance, data were only available for a limited number of surveillance areas. Incidence was first estimated based on data from 18 states and 2 cities included in the analyses and then extrapolated to the rest of the United States by applying the stratum-specific ratio of HIV incidence to the number of new diagnoses of HIV infection in the HIV incidence surveillance areas contributing data for analysis to the stratum-specific number of new diagnoses of HIV infection in the rest of the 50 states and District of Columbia [1,2].

## Assumptions

HIV incidence is estimated using a complex statistical model, which relies on a series of assumptions. Important assumptions include: (1) conditional on the observed variables, missing data on testing group and BED results are missing at random; (2) information on testing group, especially the date of last negative HIV test, is accurate; (3) the BED recency period distribution is well defined; (4) the likelihood of HIV testing prior to a diagnosis of AIDS is constant both with respect to time and to duration of HIV infection; (5) all HIV infections will eventually be diagnosed either through testing or through death; (6) HIV incidence has been relatively stable in the most recent two years; (7) testing behavior has not changed over several years [1,3].

## Limitations

1. Incidence was estimated based on data from 18 states and 2 cities conducting HIV incidence surveillance. The included areas represented 72% of the diagnoses of HIV infection in the United States in 2007 and 2008, and 73% in 2009 and 2010.
2. The extrapolation of HIV incidence from the included areas to the rest of the United States is based on the assumption that the ratio of HIV incidence to HIV diagnoses is the same for the included areas and the rest of the United States—an assumption that cannot be validated. However, the use of 83 strata in the estimation and the extrapolation might help to limit the over- and under-estimation.
3. Concerns about using the BED assay within STARHS for cross-sectional estimation of HIV incidence have been raised for some HIV subtypes due to the misclassification of long-standing infections as recent [14]; however, these issues are less relevant in the United States because:
   a. the United States epidemic is primarily subtype-B;
   b. in the United States, HIV incidence is not estimated using a cross-sectional survey of prevalent cases as in other countries;
   c. collection of STARHS results and supplemental data on history of HIV testing and antiretroviral use have been integrated into NHSS allowing for the reclassification of late diagnoses as long-standing regardless of the STARHS results [15].
4. Incidence estimation is based on many assumptions. Violating these assumptions will bias incidence estimates; for example, if the assumption of constant HIV testing behavior is violated when HIV testing has increased recently, HIV incidence would have been overestimated. The effects of these assumptions were determined to be minimal or to counterbalance one another.

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**Table 1. Estimated incidence of HIV infection, by year of infection and selected characteristics, 2007–2010—United States**

| | 2007 | | | | | 2008 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | (95% CI)[a] | Rate | (95% CI)[a] | No. | % | (95% CI)[a] | Rate | (95% CI)[a] |
| **Age at infection (yr)** | | | | | | | | | | |
| 13–24 | 10,800 | 20 | (9,300–12,400) | 21.2 | (18.1–24.2) | 10,700 | 23 | (9,300–12,200) | 21.0 | (18.1–23.9) |
| 25–34 | 16,200 | 30 | (14,000–18,500) | 40.2 | (34.6–45.7) | 14,700 | 31 | (12,700–16,700) | 36.0 | (31.1–40.8) |
| 35–44 | 15,400 | 29 | (13,300–17,500) | 35.9 | (31.0–40.8) | 12,400 | 26 | (10,600–14,100) | 29.3 | (25.2–33.3) |
| 45–54 | 8,300 | 16 | (7,000–9,700) | 19.1 | (15.9–22.2) | 7,400 | 16 | (6,200–8,600) | 16.7 | (13.9–19.5) |
| ≥55 | 2,500 | 5 | (1,800–3,100) | 3.5 | (2.6–4.4) | 2,200 | 5 | (1,700–2,800) | 3.1 | (2.3–3.9) |
| **Race/ethnicity** | | | | | | | | | | |
| American Indian/Alaska Native | 160 | <1 | (10–300) | 8.5 | (0.5–16.5) | 270 | 1 | (0–540) | 14.3 | (0.0–29.0) |
| Asian | 1,100 | 2 | (730–1,500) | 10.4 | (6.8–14.1) | 1,000 | 2 | (650–1,400) | 9.5 | (5.9–13.1) |
| Black/African American | 23,500 | 44 | (20,300–26,600) | 79.4 | (68.7–90.0) | 22,100 | 47 | (19,300–24,900) | 73.8 | (64.3–83.3) |
| Hispanic/Latino[b] | 10,600 | 20 | (9,000–12,300) | 31.6 | (26.8–36.5) | 9,100 | 19 | (7,700–10,500) | 26.3 | (22.1–30.4) |
| Native Hawaiian/Other Pacific Islander | 130 | <1 | (0–330) | 37.3 | (0.0–94.8) | 70 | <1 | (0–150) | 20.6 | (0.0–43.1) |
| White | 16,800 | 32 | (14,500–19,100) | 9.9 | (8.6–11.3) | 14,000 | 29 | (12,100–15,900) | 8.2 | (7.1–9.4) |
| Multiple races | 890 | 2 | (510–1,300) | 32.4 | (18.6–46.3) | 830 | 2 | (490–1,200) | 29.4 | (17.2–41.5) |
| **Transmission category** | | | | | | | | | | |
| **Male** | | | | | | | | | | |
| Male-to-male sexual contact | 30,100 | 76 | (26,400–33,700) | — | — | 26,700 | 75 | (23,400–30,000) | — | — |
| Injection drug use | 3,100 | 8 | (2,100–4,000) | — | — | 2,900 | 8 | (2,000–3,800) | — | — |
| Male-to-male sexual contact and injection drug use | 1,900 | 5 | (1,400–2,400) | — | — | 1,400 | 4 | (980–1,800) | — | — |
| Heterosexual contact[c] | 4,600 | 12 | (3,600–5,600) | — | — | 4,500 | 13 | (3,500–5,500) | — | — |
| Other[d] | 40 | <1 | (0–140) | — | — | 20 | <1 | (0–90) | — | — |
| **Subtotal** | 39,600 | 74 | (34,900–44,300) | 32.6 | (28.7–36.5) | 35,500 | 75 | (31,300–39,700) | 28.9 | (25.5–32.3) |
| **Female** | | | | | | | | | | |
| Injection drug use | 2,600 | 19 | (1,800–3,400) | — | — | 2,100 | 18 | (1,500–2,800) | — | — |
| Heterosexual contact[c] | 11,000 | 81 | (9,400–12,600) | — | — | 9,800 | 82 | (8,200–11,400) | — | — |
| Other[d] | 30 | <1 | (0–130) | — | — | 50 | <1 | (0–160) | — | — |
| **Subtotal** | 13,600 | 26 | (11,500–15,600) | 10.7 | (9.1–12.3) | 12,000 | 25 | (10,100–13,900) | 9.4 | (7.9–10.8) |
| **Total[e]** | 53,200 | 100 | (47,000–59,400) | 21.4 | (18.9–23.9) | 47,500 | 100 | (42,000–53,000) | 18.9 | (16.7–21.1) |

**Table 1. Estimated incidence of HIV infection, by year of infection and selected characteristics, 2007–2010—United States *(cont)***

| | 2009 | | | | | 2010 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | (95% CI)[a] | Rate | (95% CI)[a] | No. | % | (95% CI)[a] | Rate | (95% CI)[a] |
| **Age at infection (yr)** | | | | | | | | | | |
| 13–24 | 10,700 | 24 | (9,200–12,200) | 20.9 | (18.0–23.8) | 12,200 | 26 | (10,500–13,800) | 23.7 | (20.5–27.0) |
| 25–34 | 13,300 | 30 | (11,500–15,100) | 31.9 | (27.7–36.2) | 14,500 | 31 | (12,500–16,400) | 34.9 | (30.2–39.6) |
| 35–44 | 11,700 | 26 | (10,000–13,400) | 28.2 | (24.1–32.3) | 11,300 | 24 | (9,700–13,000) | 27.3 | (23.2–31.4) |
| 45–54 | 7,000 | 16 | (5,800–8,200) | 15.7 | (13.1–18.3) | 7,100 | 15 | (5,900–8,300) | 15.8 | (13.1–18.5) |
| ≥55 | 2,300 | 5 | (1,700–2,900) | 3.1 | (2.3–3.9) | 2,500 | 5 | (1,800–3,100) | 3.3 | (2.5–4.1) |
| **Race/ethnicity** | | | | | | | | | | |
| American Indian/Alaska Native | 230 | 1 | (40–410) | 11.9 | (2.2–21.8) | 210 | <1 | (20–400) | 11.0 | (0.9–21.1) |
| Asian | 930 | 2 | (560–1,300) | 8.2 | (4.9–11.5) | 950 | 2 | (560–1,300) | 8.4 | (5.0–11.8) |
| Black/African American | 19,700[f] | 44 | (17,200–22,100) | 64.9 | (56.8–73.1) | 20,900 | 44 | (18,200–23,600) | 68.9 | (59.9–77.8) |
| Hispanic/Latino[b] | 9,200 | 20 | (7,800–10,500) | 25.7 | (21.8–29.5) | 9800 | 21 | (8,300–11,400) | 27.5 | (23.2–31.8) |
| Native Hawaiian/Other Pacific Islander | 150 | <1 | (0–360) | 42.3 | (0.0–99.9) | 70 | <1 | (0–170) | 19.0 | (0.0–48.1) |
| White | 14,200 | 32 | (12,200–16,100) | 8.3 | (7.1–9.4) | 14,900 | 31 | (12,800–17,000) | 8.7 | (7.5–9.9) |
| Multiple races | 670 | 1 | (380–960) | 23.1 | (13.1–33.0) | 710 | 1 | (390–1,000) | 24.2 | (13.5–34.9) |
| **Transmission category** | | | | | | | | | | |
| **Male** | | | | | | | | | | |
| Male-to-male sexual contact | 27,100 | 79 | (23,700–30,400) | — | — | 29,800[f,g] | 78 | (26,200–33,500) | — | — |
| Injection drug use | 2,100 | 6 | (1,400–2,800) | — | — | 2,400 | 6 | (1,400–3,400) | — | — |
| Male-to-male sexual contact and injection drug use | 1,400 | 4 | (950–1,800) | — | — | 1,600 | 4 | (1,100–2,200) | — | — |
| Heterosexual contact[c] | 3,800 | 11 | (3,000–4,600) | — | — | 4,100 | 11 | (3,100–5,200) | — | — |
| Other[d] | 10 | 0 | (0–90) | — | — | 20 | <1 | (0–90) | — | — |
| **Subtotal** | 34,400 | 76 | (30,300–38,400) | 27.7 | (24.4–31.0) | 38,000[g] | 80 | (33,400–42,600) | 30.7 | (27.0–34.4) |
| **Female** | | | | | | | | | | |
| Injection drug use | 1,800 | 17 | (1,100–2,400) | — | — | 1,500 | 16 | (970–2,000) | — | — |
| Heterosexual contact[c] | 8,800 | 83 | (7,400–10,200) | — | — | 8,000[f] | 84 | (6,700–9,200) | — | — |
| Other[d] | 20 | <1 | (0–90) | — | — | 10 | <1 | (0–50) | — | — |
| **Subtotal** | 10,600 | 24 | (9,000–12,300) | 8.2 | (6.9–9.5) | 9,500[f] | 20 | (8,100–10,900) | 7.3 | (6.2–8.5) |
| **Total[e]** | **45,000** | **100** | **(39,900–50,100)** | **17.8** | **(15.7–19.8)** | **47,500** | **100** | **(42,000–53,000)** | **18.8** | **(16.6–20.9)** |

*Note.* Rates are per 100,000 population. 2010 rates are based on 2009 population estimates. Rates are not calculated by transmission category because of the lack of denominator data. Data by transmission category have been statistically adjusted to account for missing risk-factor information.

[a] CI = Confidence Interval. Confidence intervals reflect random variability affecting model uncertainty but may not reflect model-assumption uncertainty; thus, they should be interpreted with caution.

[b] Hispanics/Latinos can be of any race.

[c] Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[d] Includes hemophilia, blood transfusion, perinatal exposure, and risk factor not reported or not identified.

[e] Because column totals for estimated numbers were calculated independently of the values for the subpopulations, the values in each column may not sum to the column total. Similarly, because column percentages were computed using these independently calculated totals, the percentages in each column may not sum to 100%.

[f] Indicates significantly different (p<0.05) from the 2008 estimate for the same group.

[g] Indicates significantly different (p<0.05) from the 2009 estimate for the same group.

**Table 2. Estimated incidence of HIV infection among blacks/African Americans, by year of infection, sex, and selected characteristics, 2007–2010—United States**

| | 2007 | | | | | 2008 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | (95% CI)[a] | Rate | (95% CI)[a] | No. | % | (95% CI)[a] | Rate | (95% CI)[a] |
| **Male** | | | | | | | | | | |
| Age at infection (yr) | | | | | | | | | | |
| 13–24 | 4,400 | 29 | (3,600–5,200) | 114.1 | (93.4–134.9) | 4,600 | 32 | (3,800–5,400) | 120.1 | (99.5–140.7) |
| 25–34 | 4,300 | 28 | (3,400–5,200) | 167.6 | (132.2–203.0) | 4,100 | 28 | (3,300–5,000) | 156.1 | (123.6–188.6) |
| 35–44 | 3,700 | 24 | (2,900–4,600) | 149.0 | (115.9–182.2) | 3,200 | 22 | (2,500–3,900) | 128.5 | (99.4–157.6) |
| 45–54 | 2,200 | 14 | (1,600–2,800) | 92.4 | (66.7–118.0) | 1,900 | 13 | (1,400–2,500) | 80.7 | (57.5–104.0) |
| ≥55 | 710 | 5 | (400–1,000) | 26.8 | (15.0–38.7) | 620 | 4 | (330–910) | 22.6 | (12.0–33.2) |
| Transmission category | | | | | | | | | | |
| Male-to-male sexual contact | 10,300 | 68 | (8,800–11,800) | — | — | 9,600 | 67 | (8,200–11,000) | — | — |
| Injection drug use | 1,500 | 10 | (870–2,100) | — | — | 1,400 | 10 | (840–2,000) | — | — |
| Male-to-male sexual contact and injection drug use | 550 | 4 | (270–830) | — | — | 430 | 3 | (230–640) | — | — |
| Heterosexual contact[b] | 2,900 | 19 | (2,200–3,600) | — | — | 3,000 | 21 | (2,200–3,800) | — | — |
| **Subtotal** | 15,200 | 65 | (13,100–17,400) | 110.0 | (94.3–125.7) | 14,400 | 65 | (12,400–16,400) | 102.7 | (88.3–117.0) |
| **Female** | | | | | | | | | | |
| Age at infection (yr) | | | | | | | | | | |
| 13–24 | 1,700 | 21 | (1,300–2,200) | 46.5 | (34.0–59.0) | 1,500 | 19 | (1,100–1,900) | 39.3 | (28.9–49.7) |
| 25–34 | 2,400 | 29 | (1,800–3,100) | 88.3 | (64.4–112.3) | 2,400 | 31 | (1,800–2,900) | 85.9 | (65.7–106.1) |
| 35–44 | 2,200 | 27 | (1,600–2,900) | 79.3 | (57.5–101.2) | 1,900 | 25 | (1,400–2,400) | 68.5 | (49.4–87.5) |
| 45–54 | 1,500 | 18 | (960–2,000) | 54.0 | (35.4–72.5) | 1,500 | 19 | (950–2,000) | 53.5 | (34.4–72.5) |
| ≥55 | 380 | 5 | (150–600) | 10.1 | (4.1–16.1) | 450 | 6 | (180–710) | 11.6 | (4.7–18.5) |
| Transmission category | | | | | | | | | | |
| Injection drug use | 1,300 | 16 | (710–1,900) | — | — | 1,100 | 14 | (630–1,600) | — | — |
| Heterosexual contact[b] | 6,900 | 84 | (5,800–8,100) | — | — | 6,500 | 84 | (5,300–7,700) | — | — |
| **Subtotal** | 8,200 | 35 | (6,800–9,700) | 52.4 | (43.2–61.5) | 7,700 | 35 | (6,300–9,000) | 48.3 | (39.8–56.8) |
| **Total[c]** | **23,500** | **100** | **(20,300–26,600)** | **79.4** | **(68.7–90.0)** | **22,100** | **100** | **(19,300–24,900)** | **73.8** | **(64.3–83.3)** |

**Table 2. Estimated incidence of HIV infection among blacks/African Americans, by year of infection, sex, and selected characteristics, 2007–2010—United States** *(cont)*

| | 2009 | | | | | 2010 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | (95% CI)[a] | Rate | (95% CI)[a] | No. | % | (95% CI)[a] | Rate | (95% CI)[a] |
| **Male** | | | | | | | | | | |
| **Age at infection (yr)** | | | | | | | | | | |
| 13–24 | 4,700 | 35 | (3,900–5,600) | 123.3 | (101.5–145.2) | 5,600 | 38 | (4,600–6,500) | 144.9 | (120.1–169.8) |
| 25–34 | 3,800 | 28 | (3,000–4,500) | 139.0 | (111.8–166.3) | 4,100 | 28 | (3,300–4,900) | 150.5 | (121.1–179.9) |
| 35–44 | 2,900 | 21 | (2,200–3,600) | 118.2 | (89.0–147.3) | 2,800 | 19 | (2,000–3,500) | 113.2 | (81.2–145.3) |
| 45–54 | 1,600 | 12 | (1,100–2,000) | 65.6 | (46.9–84.2) | 1,800 | 12 | (1,200–2,300) | 73.6 | (50.8–96.4) |
| ≥55 | 510 | 4 | (280–750) | 18.1 | (9.7–26.4) | 590 | 4 | (320–850) | 20.6 | (11.3–29.9) |
| **Transmission category** | | | | | | | | | | |
| Male-to-male sexual contact | 9,700 | 72 | (8,200–11,100) | — | — | 10,600 | 72 | (9,000–12,100) | — | — |
| Injection drug use | 1,000 | 7 | (560–1,400) | — | — | 1,100 | 7 | (470–1,700) | — | — |
| Male-to-male sexual contact and injection drug use | 340 | 3 | (160–530) | — | — | 420 | 3 | (180–660) | — | — |
| Heterosexual contact[b] | 2,400 | 18 | (1,800–3,000) | — | — | 2,700 | 18 | (2,000–3,400) | — | — |
| **Subtotal** | 13,500 | 69 | (11,600–15,300) | 94.6 | (81.5–107.8) | 14,700 | 70 | (12,600–16,900) | 103.6 | (88.7–118.6) |
| **Female** | | | | | | | | | | |
| **Age at infection (yr)** | | | | | | | | | | |
| 13–24 | 1,400 | 23 | (940–1,800) | 36.9 | (25.2–48.6) | 1,400 | 23 | (1,000–1,800) | 38.4 | (27.4–49.3) |
| 25–34 | 1,600[d] | 26 | (1,200–2,000) | 57.3 | (43.1–71.5) | 1,800 | 30 | (1,300–2,300) | 63.7 | (47.5–80.0) |
| 35–44 | 1,600 | 26 | (1,200–2,100) | 59.0 | (43.1–74.9) | 1,500 | 25 | (1,100–2,000) | 55.5 | (38.7–72.2) |
| 45–54 | 1,200 | 19 | (780–1,600) | 41.7 | (27.9–55.6) | 1,000 | 16 | (690–1,300) | 35.8 | (24.5–47.1) |
| ≥55 | 430 | 7 | (200–660) | 10.8 | (5.1–16.6) | 370 | 6 | (190–550) | 9.4 | (4.9–13.9) |
| **Transmission category** | | | | | | | | | | |
| Injection drug use | 790 | 13 | (400–1,200) | — | — | 850 | 14 | (410–1,300) | — | — |
| Heterosexual contact[b] | 5,400 | 87 | (4,500–6,400) | — | — | 5,300[d] | 87 | (4,400–6,200) | — | — |
| **Subtotal** | 6,200[d] | 31 | (5,200–7,300) | 38.6 | (32.1–45.2) | 6,100[d] | 29 | (5,100–7,200) | 38.1 | (31.6–44.6) |
| **Total**[c] | 19,700[d] | 100 | (17,200–22,100) | 64.9 | (56.8–73.1) | 20,900 | 100 | (18,200–23,600) | 68.9 | (59.9–77.8) |

*Note.* Rates are per 100,000 population. 2010 rates are based on 2009 population estimates. Rates are not calculated by transmission category because of the lack of denominator data. Data by transmission category have been statistically adjusted to account for missing risk-factor information.

[a] CI = Confidence Interval. Confidence intervals reflect random variability affecting model uncertainty but may not reflect model-assumption uncertainty; thus, they should be interpreted with caution.

[b] Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[c] Because column totals for estimated numbers were calculated independently of the values for the subpopulations, the values in each column may not sum to the column total. Similarly, because column percentages were computed using these independently calculated totals, the percentages in each column may not sum to 100%.

[d] Indicates significantly different (p<0.05) from the 2008 estimate for the same group.

**Table 3. Estimated incidence of HIV infection among Hispanics/Latinos, by year of infection, sex, and selected characteristics, 2007–2010—United States**

| | 2007 | | | | | 2008 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | (95% CI)[a] | Rate | (95% CI)[a] | No. | % | (95% CI)[a] | Rate | (95% CI)[a] |
| **Male** | | | | | | | | | | |
| **Age at infection (yr)** | | | | | | | | | | |
| 13–24 | 1,700 | 20 | (1,300–2,100) | 35.8 | (26.9–44.7) | 1,700 | 23 | (1,300–2,200) | 35.5 | (26.8–44.2) |
| 25–34 | 3,300 | 39 | (2,600–4,000) | 75.0 | (58.7–91.2) | 2,900 | 39 | (2,200–3,500) | 64.7 | (50.0–79.4) |
| 35–44 | 2,400 | 28 | (1,800–3,000) | 66.4 | (49.7–83.2) | 1,900 | 25 | (1,400–2,400) | 51.6 | (38.4–64.9) |
| 45–54 | 920 | 11 | (570–1,300) | 38.6 | (24.0–53.2) | 750 | 10 | (460–1,100) | 30.0 | (18.2–41.8) |
| ≥55 | 250 | 3 | (90–400) | 10.5 | (3.8–17.2) | 200 | 3 | (60–350) | 8.2 | (2.3–14.0) |
| **Transmission category** | | | | | | | | | | |
| Male-to-male sexual contact | 6,200 | 73 | (5,200–7,300) | — | — | 5,600 | 75 | (4,600–6,500) | — | — |
| Injection drug use | 920 | 11 | (470–1,400) | — | — | 720 | 10 | (340–1,100) | — | — |
| Male-to-male sexual contact and injection drug use | 380 | 4 | (180–590) | — | — | 320 | 4 | (140–510) | — | — |
| Heterosexual contact[b] | 970 | 11 | (530–1,400) | — | — | 830 | 11 | (470–1,200) | — | — |
| **Subtotal** | 8,500 | 80 | (7,100–9,900) | 48.8 | (40.8–56.8) | 7,500 | 82 | (6,200–8,700) | 41.4 | (34.6–48.2) |
| **Female** | | | | | | | | | | |
| **Age at infection (yr)** | | | | | | | | | | |
| 13–24 | 460 | 22 | (250–660) | 10.5 | (5.8–15.2) | 300 | 19 | (160–430) | 6.7 | (3.7–9.7) |
| 25–34 | 610 | 29 | (340–890) | 17.2 | (9.6–24.8) | 530 | 33 | (320–740) | 14.6 | (8.8–20.4) |
| 35–44 | 570 | 27 | (320–820) | 18.1 | (10.1–26.1) | 460 | 29 | (230–680) | 14.2 | (7.2–21.2) |
| 45–54 | 350 | 17 | (140–560) | 15.2 | (6.0–24.4) | 300 | 19 | (130–460) | 12.2 | (5.5–18.9) |
| ≥55 | 130 | 6 | (0–270) | 4.6 | (0.0–9.7) | 60 | 4 | (0–150) | 2.1 | (0.0–5.0) |
| **Transmission category** | | | | | | | | | | |
| Injection drug use | 360 | 17 | (120–610) | — | — | 290 | 18 | (110–460) | — | — |
| Heterosexual contact[b] | 1,700 | 81 | (1,300–2,200) | — | — | 1,300 | 81 | (970–1,700) | — | — |
| **Subtotal** | 2,100 | 20 | (1,600–2,700) | 13.1 | (9.6–16.6) | 1,600 | 18 | (1,200–2,100) | 9.8 | (7.3–12.4) |
| **Total[c]** | **10,600** | **100** | **(9,000–12,300)** | **31.6** | **(26.8–36.5)** | **9,100** | **100** | **(7,700–10,500)** | **26.3** | **(22.1–30.4)** |

**Table 3. Estimated incidence of HIV infection among Hispanics/Latinos, by year of infection, sex, and selected characteristics, 2007–2010—United States** *(cont)*

| | 2009 | | | | | 2010 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | (95% CI)[a] | Rate | (95% CI)[a] | No. | % | (95% CI)[a] | Rate | (95% CI)[a] |
| **Male** | | | | | | | | | | |
| Age at infection (yr) | | | | | | | | | | |
| 13–24 | 1,600 | 22 | (1,300–2,000) | 32.7 | (25.1–40.3) | 2,100 | 25 | (1,600–2,500) | 41.4 | (32.0–50.8) |
| 25–34 | 2,700 | 38 | (2,100–3,300) | 59.7 | (46.5–72.9) | 3,100 | 36 | (2,500–3,800) | 69.7 | (54.5–84.8) |
| 35–44 | 1,900 | 26 | (1,400–2,500) | 51.4 | (37.5–65.3) | 2,100 | 25 | (1,500–2,700) | 54.8 | (39.1–70.5) |
| 45–54 | 750 | 10 | (380–1,100) | 28.4 | (14.4–42.5) | 870 | 10 | (560–1,200) | 32.9 | (21.2–44.6) |
| ≥55 | 210 | 3 | (60–360) | 7.9 | (2.1–13.7) | 310 | 4 | (70–540) | 11.6 | (2.8–20.5) |
| Transmission category | | | | | | | | | | |
| Male-to-male sexual contact | 5,700 | 79 | (4,700–6,600) | — | — | 6,700 | 79 | (5,500–7,800) | — | — |
| Injection drug use | 560 | 8 | (230–880) | — | — | 680 | 8 | (300–1,100) | — | — |
| Male-to-male sexual contact and injection drug use | 230 | 3 | (80–380) | — | — | 320 | 4 | (140–500) | — | — |
| Heterosexual contact[b] | 770 | 11 | (400–1,100) | — | — | 780 | 9 | (400–1,200) | — | — |
| **Subtotal** | 7,200 | 78 | (6,100–8,400) | 38.9 | (32.7–45.2) | 8,500 | 87 | (7,000–9,900) | 45.5 | (38.0–53.1) |
| **Female** | | | | | | | | | | |
| Age at infection (yr) | | | | | | | | | | |
| 13–24 | 350 | 18 | (150–560) | 7.8 | (3.3–12.3) | 290 | 21 | (140–450) | 6.4 | (3.0–9.9) |
| 25–34 | 630 | 33 | (360–900) | 17.1 | (9.9–24.4) | 410 | 29 | (230–600) | 11.2 | (6.1–16.2) |
| 35–44 | 490 | 26 | (280–710) | 15.1 | (8.4–21.8) | 340 | 24 | (160–510) | 10.3 | (4.9–15.7) |
| 45–54 | 300 | 16 | (110–480) | 11.7 | (4.3–19.2) | 220 | 16 | (70–380) | 8.9 | (2.8–15.0) |
| ≥55 | 170 | 9 | (0–350) | 5.5 | (0.0–11.1) | 100 | 7 | (0–200) | 3.3 | (0.1–6.5) |
| Transmission category | | | | | | | | | | |
| Injection drug use | 350 | 18 | (110–600) | — | — | 170 | 12 | (10–340) | — | — |
| Heterosexual contact[b] | 1,600 | 84 | (1,100–2,000) | — | — | 1,200 | 86 | (840–1,600) | — | — |
| **Subtotal** | 1,900 | 21 | (1,400–2,500) | 11.3 | (8.3–14.4) | 1,400 | 14 | (980–1,800) | 8.0 | (5.7–10.3) |
| **Total[c]** | **9,200** | **100** | **(7,800–10,500)** | **25.7** | **(21.8–29.5)** | **9,800** | **100** | **(8,300–11,400)** | **27.5** | **(23.2–31.8)** |

*Notes.* Hispanics/Latinos can be of any race. Rates are per 100,000 population. 2010 rates are based on 2009 population estimates. Rates are not calculated by transmission category because of the lack of denominator data. Data by transmission category have been statistically adjusted to account for missing risk-factor information.

[a] CI = Confidence Interval. Confidence intervals reflect random variability affecting model uncertainty but may not reflect model-assumption uncertainty; thus, they should be interpreted with caution.

[b] Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[c] Because column totals for estimated numbers were calculated independently of the values for the subpopulations, the values in each column may not sum to the column total. Similarly, because column percentages were computed using these independently calculated totals, the percentages in each column may not sum to 100%.

**Table 4. Estimated incidence of HIV infection among whites, by year of infection, sex, and selected characteristics, 2007–2010—United States**

| | 2007 | | | | | 2008 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | (95% CI)[a] | Rate | (95% CI)[a] | No. | % | (95% CI)[a] | Rate | (95% CI)[a] |
| **Male** | | | | | | | | | | |
| Age at infection (yr) | | | | | | | | | | |
| 13–24 | 1,500 | 11 | (1,200–1,900) | 9.7 | (7.3–12.0) | 1,800 | 15 | (1,300–2,200) | 11.1 | (8.0–14.2) |
| 25–34 | 3,900 | 28 | (3,100–4,600) | 32.2 | (26.0–38.4) | 3,300 | 28 | (2,700–4,000) | 27.3 | (22.0–32.6) |
| 35–44 | 5,000 | 36 | (4,100–5,900) | 35.9 | (29.1–42.6) | 3,700 | 31 | (3,000–4,400) | 27.3 | (22.1–32.6) |
| 45–54 | 2,700 | 19 | (2,100–3,300) | 17.2 | (13.3–21.1) | 2,300 | 19 | (1,700–2,800) | 14.6 | (10.9–18.2) |
| ≥55 | 780 | 6 | (470–1,100) | 3.1 | (1.8–4.3) | 720 | 6 | (410–1,000) | 2.8 | (1.6–3.9) |
| Transmission category | | | | | | | | | | |
| Male-to-male sexual contact | 11,800 | 85 | (10,100–13,500) | — | — | 9,900 | 84 | (8,500–11,400) | — | — |
| Injection drug use | 590 | 4 | (300–890) | — | — | 660 | 6 | (300–1,000) | — | — |
| Male-to-male sexual contact and injection drug use | 810 | 6 | (560–1,100) | — | — | 600 | 5 | (360–840) | — | — |
| Heterosexual contact[b] | 600 | 4 | (280–920) | — | — | 570 | 5 | (270–870) | — | — |
| **Subtotal** | 13,900 | 83 | (11,900–15,800) | 16.8 | (14.4–19.1) | 11,800 | 84 | (10,100–13,400) | 14.2 | (12.2–16.2) |
| **Female** | | | | | | | | | | |
| Age at infection (yr) | | | | | | | | | | |
| 13–24 | 510 | 18 | (260–770) | 3.4 | (1.7–5.1) | 410 | 18 | (190–630) | 2.7 | (1.3–4.2) |
| 25–34 | 870 | 30 | (470–1,300) | 7.3 | (4.0–10.7) | 660 | 29 | (390–920) | 5.5 | (3.3–7.7) |
| 35–44 | 870 | 30 | (510–1,200) | 6.3 | (3.7–8.8) | 650 | 28 | (360–940) | 4.8 | (2.6–7.0) |
| 45–54 | 560 | 19 | (270–850) | 3.5 | (1.7–5.3) | 400 | 17 | (180–630) | 2.5 | (1.1–3.9) |
| ≥55 | 130 | 4 | (0–260) | 0.4 | (0.0–0.9) | 140 | 6 | (10–260) | 0.4 | (0.0–0.8) |
| Transmission category | | | | | | | | | | |
| Injection drug use | 870 | 30 | (510–1,200) | — | — | 630 | 27 | (340–920) | — | — |
| Heterosexual contact[b] | 2,100 | 72 | (1,400–2,700) | — | — | 1,600 | 70 | (1,100–2,100) | — | — |
| **Subtotal** | 2,900 | 17 | (2,200–3,700) | 3.4 | (2.5–4.2) | 2,300 | 16 | (1,700–2,800) | 2.6 | (1.9–3.2) |
| **Total[c]** | 16,800 | 100 | (14,500–19,100) | 9.9 | (8.6–11.3) | 14,000 | 100 | (12,100–15,900) | 8.2 | (7.1–9.4) |

**Table 4. Estimated incidence of HIV infection among whites, by year of infection, sex, and selected characteristics, 2007–2010—United States** *(cont)*

| | 2009 | | | | | 2010 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | (95% CI)[a] | Rate | (95% CI)[a] | No. | % | (95% CI)[a] | Rate | (95% CI)[a] |
| **Male** | | | | | | | | | | |
| **Age at infection (yr)** | | | | | | | | | | |
| 13–24 | 1,800 | 15 | (1,300–2,200) | 11.3 | (8.5–14.1) | 2,100 | 16 | (1,600–2,500) | 13.1 | (10.1–16.2) |
| 25–34 | 3,100 | 26 | (2,500–3,800) | 25.3 | (20.2–30.4) | 3,900 | 30 | (3,100–4,700) | 31.1 | (24.8–37.5) |
| 35–44 | 3,800 | 32 | (3,000–4,600) | 28.7 | (22.7–34.7) | 3,700 | 28 | (2,900–4,600) | 28.5 | (21.9–35.1) |
| 45–54 | 2,500 | 21 | (1,900–3,100) | 16.1 | (12.0–20.1) | 2,600 | 20 | (1,900–3,300) | 16.8 | (12.4–21.3) |
| ≥55 | 800 | 7 | (460–1,100) | 3.0 | (1.8–4.3) | 900 | 7 | (530–1,300) | 3.4 | (2.0–4.8) |
| **Transmission category** | | | | | | | | | | |
| Male-to-male sexual contact | 10,300 | 86 | (8,700–11,800) | — | — | 11,200 | 85 | (9,500–12,800) | — | — |
| Injection drug use | 510 | 4 | (190–840) | — | — | 590 | 4 | (140–1,000) | — | — |
| Male-to-male sexual contact and injection drug use | 650 | 5 | (400–890) | — | — | 810 | 6 | (460–1,200) | — | — |
| Heterosexual contact[b] | 540 | 5 | (240–840) | — | — | 620 | 5 | (220–1,000) | — | — |
| **Subtotal** | 12,000 | 85 | (10,300–13,700) | 14.4 | (12.3–16.5) | 13,200 | 89 | (11,300–15,100) | 15.8 | (13.5–18.2) |
| **Female** | | | | | | | | | | |
| **Age at infection (yr)** | | | | | | | | | | |
| 13–24 | 390 | 18 | (180–610) | 2.7 | (1.2–4.1) | 280 | 16 | (110–440) | 1.9 | (0.8–3.0) |
| 25–34 | 650 | 30 | (300–990) | 5.3 | (2.5–8.2) | 480 | 28 | (230–740) | 4.0 | (1.9–6.1) |
| 35–44 | 540 | 25 | (230–850) | 4.1 | (1.7–6.5) | 480 | 28 | (220–740) | 3.7 | (1.7–5.6) |
| 45–54 | 480 | 22 | (200–760) | 3.0 | (1.3–4.8) | 350 | 21 | (160–540) | 2.2 | (1.0–3.4) |
| ≥55 | 110 | 5 | (20–200) | 0.3 | (0.1–0.6) | 110 | 6 | (0–230) | 0.4 | (0.0–0.7) |
| **Transmission category** | | | | | | | | | | |
| Injection drug use | 590 | 27 | (230–940) | — | — | 430 | 25 | (210–650) | — | — |
| Heterosexual contact[b] | 1,600 | 73 | (1,100–2,100) | — | — | 1,300 | 76 | (850–1,700) | — | — |
| **Subtotal** | 2,200 | 15 | (1,500–2,800) | 2.5 | (1.7–3.2) | 1,700 | 11 | (1,200–2,200) | 1.9 | (1.4–2.5) |
| **Total[c]** | **14,200** | **100** | **(12,200–16,100)** | **8.3** | **(7.1–9.4)** | **14,900** | **100** | **(12,800–17,000)** | **8.7** | **(7.5–9.9)** |

*Note*. Rates are per 100,000 population. 2010 rates are based on 2009 population estimates. Rates are not calculated by transmission category because of the lack of denominator data. Data by transmission category have been statistically adjusted to account for missing risk-factor information.

[a] CI = Confidence Interval. Confidence intervals reflect random variability affecting model uncertainty but may not reflect model-assumption uncertainty; thus, they should be interpreted with caution.

[b] Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[c] Because column totals for estimated numbers were calculated independently of the values for the subpopulations, the values in each column may not sum to the column total. Similarly, because column percentages were computed using these independently calculated totals, the percentages in each column may not sum to 100%.

**Table 5. Estimated incidence of HIV infection among black/African American, Hispanic/Latino, and white men who have sex with men, by year of infection, race/ethnicity, and age at infection, 2007–2010—United States**

| | 2007 | | | 2008 | | | 2009 | | | 2010 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | (95% CI)[a] | No. | % | (95% CI)[a] | No. | % | (95% CI)[a] | No. | % | (95% CI)[a] |
| **Black/African American** | | | | | | | | | | | | |
| Age at infection (yr) | | | | | | | | | | | | |
| 13–24 | 3,700 | 36 | (3,000–4,400) | 4,000 | 42 | (3,200–4,700) | 4,100 | 42 | (3,400–4,900) | 4,800 | 45 | (4,000–5,700) |
| 25–34 | 3,300 | 32 | (2,500–4,100) | 2,800 | 29 | (2,200–3,500) | 2,900 | 30 | (2,200–3,500) | 3,100 | 29 | (2,400–3,800) |
| 35–44 | 2,100 | 20 | (1,600–2,700) | 1,800 | 19 | (1,300–2,300) | 1,800 | 19 | (1,300–2,300) | 1,600 | 15 | (1,100–2,200) |
| 45–54 | 900 | 9 | (550–1,300) | 810 | 8 | (480–1,100) | 700 | 7 | (420–980) | 830 | 8 | (440–1,200) |
| ≥55 | 240 | 2 | (60–430) | 190 | 2 | (50–330) | 180 | 2 | (40–320) | 160 | 2 | (30–290) |
| Subtotal[b] | 10,300 | 34 | (8,800–11,800) | 9,600 | 36 | (8,200–11,000) | 9,700 | 36 | (8,200–11,100) | 10,600 | 36 | (9,000–12,100) |
| **Hispanic/Latino[c]** | | | | | | | | | | | | |
| Age at infection (yr) | | | | | | | | | | | | |
| 13–24 | 1,400 | 23 | (1,100–1,800) | 1,400 | 25 | (1,100–1,700) | 1,400 | 25 | (1,100–1,700) | 1,900[e] | 28 | (1,400–2,300) |
| 25–34 | 2,500 | 40 | (1,900–3,100) | 2,200 | 39 | (1,700–2,800) | 2,200 | 39 | (1,700–2,600) | 2,600 | 39 | (2,000–3,200) |
| 35–44 | 1,600 | 26 | (1,200–2,100) | 1,400 | 25 | (1,000–1,800) | 1,500 | 26 | (1,100–1,900) | 1,500 | 22 | (1,000–1,900) |
| 45–54 | 520 | 8 | (280–750) | 440 | 8 | (240–650) | 520 | 9 | (230–800) | 580 | 9 | (340–820) |
| ≥55 | 130 | 2 | (30–240) | 100 | 2 | (20–170) | 120 | 2 | (10–230) | 180 | 3 | (20–340) |
| Subtotal[b] | 6,200 | 21 | (5,200–7,300) | 5,600 | 21 | (4,600–6,500) | 5,700 | 21 | (4,700–6,600) | 6,700 | 22 | (5,500–7,800) |
| **White** | | | | | | | | | | | | |
| Age at infection (yr) | | | | | | | | | | | | |
| 13–24 | 1,300 | 11 | (970–1,600) | 1,500 | 15 | (1,100–1,900) | 1,500 | 15 | (1,100–1,900) | 1,800 | 16 | (1,300–2,200) |
| 25–34 | 3,300 | 28 | (2,600–4,000) | 2,800 | 28 | (2,200–3,300) | 2,600 | 25 | (2,100–3,200) | 3,300 | 29 | (2,600–4,000) |
| 35–44 | 4,300 | 36 | (3,400–5,100) | 3,200 | 32 | (2,500–3,800) | 3,300 | 32 | (2,600–4,100) | 3,200 | 29 | (2,500–4,000) |
| 45–54 | 2,300 | 19 | (1,800–2,800) | 1,900 | 19 | (1,400–2,400) | 2,100 | 20 | (1,600–2,700) | 2,200 | 20 | (1,600–2,800) |
| ≥55 | 660 | 6 | (380–930) | 600 | 6 | (320–870) | 660 | 6 | (350–980) | 740 | 7 | (410–1,100) |
| Subtotal[b] | 11,800 | 39 | (10,100–13,500) | 9,900 | 37 | (8,500–11,400) | 10,300 | 38 | (8,700–11,800) | 11,200 | 38 | (9,500–12,800) |
| **All MSM[d]** | | | | | | | | | | | | |
| Age at infection (yr) | | | | | | | | | | | | |
| 13–24 | 6,800 | 23 | (5,800–7,900) | 7,200 | 27 | (6,100–8,300) | 7,400 | 27 | (6,300–8,500) | 8,800[e,f] | 30 | (7,500–10,100) |
| 25–34 | 9,800 | 33 | (8,300–11,200) | 8,500 | 32 | (7,200–9,800) | 8,200 | 30 | (7,000–9,500) | 9,600 | 32 | (8,100–11,000) |
| 35–44 | 8,600 | 29 | (7,200–9,900) | 6,800 | 25 | (5,600–7,900) | 7,000 | 26 | (5,800–8,200) | 6,600 | 22 | (5,400–7,800) |
| 45–54 | 3,800 | 13 | (3,000–4,600) | 3,300 | 12 | (2,600–3,900) | 3,500 | 13 | (2,700–4,200) | 3,700 | 12 | (2,900–4,500) |
| ≥55 | 1,100 | 4 | (700–1,500) | 920 | 3 | (600–1,200) | 980 | 4 | (600–1,400) | 1,100 | 4 | (740–1,500) |
| **Total[b]** | **30,100** | **100** | **(26,400–33,700)** | **26,700** | **100** | **(23,400–30,000)** | **27,100** | **100** | **(23,700–30,400)** | **29,800[f]** | **100** | **(26,200–33,500)** |

[a] CI = Confidence Interval. Confidence intervals reflect random variability affecting model uncertainty but may not reflect model-assumption uncertainty; thus, they should be interpreted with caution.

[b] Because column totals for estimated numbers were calculated independently of the values for the subpopulations, the values in each column may not sum to the column total. Similarly, because column percentages were computed using these independently calculated totals, the percentages in each column may not sum to 100%.

[c] Hispanics/Latinos can be of any race.

[d] Includes all races/ethnicities.

[e] Indicates significantly different (p<0.05) from the 2009 estimate for the same group.

[f] Indicates significantly different (p<0.05) from the 2008 estimate for the same group.

**Table 6. Diagnoses of HIV infection and BED results, by year of diagnosis and selected characteristics, 2007–2010—18 states and 2 cities**

| | 2007 | | | | | | | | 2008 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Non-AIDS[a] | | With BED results | | BED recent | | | | Non-AIDS[a] | | With BED results | | BED recent | | |
| | No. | No. | %[b] | No. | %[c] | No. | %[d] | Imp. %[e] | No. | No. | %[b] | No. | %[c] | No. | %[d] | Imp. %[e] |
| **Age at diagnosis (yr)** | | | | | | | | | | | | | | | | |
| 13–24 | 5,690 | 4,756 | 84 | 2,037 | 43 | 972 | 48 | 44 | 6,176 | 5,271 | 85 | 2,678 | 51 | 1,186 | 44 | 41 |
| 25–34 | 9,531 | 7,125 | 75 | 2,602 | 37 | 970 | 37 | 37 | 9,332 | 6,912 | 74 | 3,216 | 47 | 1,173 | 36 | 35 |
| 35–44 | 10,728 | 7,066 | 66 | 2,207 | 31 | 708 | 32 | 31 | 9,486 | 6,137 | 65 | 2,441 | 40 | 733 | 30 | 28 |
| 45–54 | 7,283 | 4,437 | 61 | 1,214 | 27 | 368 | 30 | 26 | 6,901 | 4,187 | 61 | 1,500 | 36 | 416 | 28 | 24 |
| ≥55 | 3,112 | 1,732 | 56 | 441 | 25 | 101 | 23 | 20 | 3,041 | 1,616 | 53 | 532 | 33 | 116 | 22 | 19 |
| **Race/ethnicity** | | | | | | | | | | | | | | | | |
| American Indian/Alaska Native | 120 | 89 | 74 | 28 | 31 | 9 | 32 | 26 | 126 | 84 | 67 | 36 | 43 | 11 | 31 | 29 |
| Asian | 643 | 431 | 67 | 111 | 26 | 55 | 50 | 45 | 642 | 414 | 64 | 154 | 37 | 67 | 44 | 40 |
| Black/African American | 15,883 | 11,018 | 69 | 4,249 | 39 | 1,420 | 33 | 30 | 16,008 | 11,222 | 70 | 5,169 | 46 | 1,693 | 33 | 30 |
| Hispanic/Latino[f] | 8,489 | 5,546 | 65 | 1,775 | 32 | 668 | 38 | 35 | 7,999 | 5,177 | 65 | 2,228 | 43 | 791 | 36 | 32 |
| Native Hawaiian/Other Pacific Islander | 49 | 29 | 59 | 8 | 28 | 2 | 25 | 41 | 50 | 37 | 74 | 8 | 22 | 3 | 38 | 43 |
| White | 10,550 | 7,619 | 72 | 2,187 | 29 | 915 | 42 | 37 | 9,573 | 6,843 | 71 | 2,605 | 38 | 993 | 38 | 34 |
| Multiple races | 610 | 384 | 63 | 143 | 37 | 50 | 35 | 32 | 538 | 346 | 64 | 167 | 48 | 66 | 40 | 35 |
| **Transmission category** | | | | | | | | | | | | | | | | |
| **Male** | | | | | | | | | | | | | | | | |
| Male-to-male sexual contact | 16,295 | 11,817 | 73 | 4,063 | 34 | 1,716 | 42 | 37 | 16,079 | 11,729 | 73 | 5,212 | 44 | 2,062 | 40 | 34 |
| Injection drug use | 1,721 | 1,094 | 64 | 283 | 26 | 69 | 24 | 24 | 1,301 | 810 | 62 | 268 | 33 | 76 | 28 | 25 |
| Male-to-male sexual contact and injection drug use | 1,091 | 803 | 74 | 275 | 34 | 109 | 40 | 34 | 884 | 614 | 69 | 248 | 40 | 83 | 33 | 30 |
| Heterosexual contact[g] | 2,566 | 1,558 | 61 | 592 | 38 | 148 | 25 | 23 | 2,496 | 1,454 | 58 | 647 | 45 | 165 | 26 | 23 |
| Other[h] | 5,859 | 3,651 | 62 | 1,026 | 28 | 305 | 30 | 23 | 5,873 | 3,614 | 62 | 1,379 | 38 | 349 | 25 | 11 |
| **Subtotal** | 27,532 | 18,923 | 69 | 6,239 | 33 | 2,347 | 38 | 34 | 26,633 | 18,221 | 68 | 7,754 | 43 | 2,735 | 35 | 32 |
| **Female** | | | | | | | | | | | | | | | | |
| Injection drug use | 916 | 677 | 74 | 215 | 32 | 90 | 42 | 33 | 771 | 581 | 75 | 244 | 42 | 95 | 39 | 32 |
| Heterosexual contact[g] | 4,289 | 3,049 | 71 | 1,161 | 38 | 406 | 35 | 31 | 4,043 | 2,910 | 72 | 1,333 | 46 | 481 | 36 | 30 |
| Other[h] | 3,607 | 2,467 | 68 | 886 | 36 | 276 | 31 | 31 | 3,489 | 2,411 | 69 | 1,036 | 43 | 313 | 30 | 39 |
| **Subtotal** | 8,812 | 6,193 | 70 | 2,262 | 37 | 772 | 34 | 31 | 8,303 | 5,902 | 71 | 2,613 | 44 | 889 | 34 | 31 |
| **Total** | **36,344** | **25,116** | **69** | **8,501** | **34** | **3,119** | **37** | **33** | **34,936** | **24,123** | **69** | **10,367** | **43** | **3,624** | **35** | **32** |

## Table 6. Diagnoses of HIV infection and BED results, by year of diagnosis and selected characteristics, 2007–2010—18 states and 2 cities *(cont)*

| | 2009 | | | | | | | | 2010 | | | | | | | |
| | | Non-AIDS[a] | | With BED results | | BED recent | | | | Non-AIDS[a] | | With BED results | | BED recent | | |
| | No. | No. | %[b] | No. | %[c] | No. | %[d] | Imp. %[e] | No. | No. | %[b] | No. | %[c] | No. | %[d] | Imp. %[e] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Age at diagnosis (yr)** | | | | | | | | | | | | | | | | |
| 13–24 | 6,244 | 5,306 | 85 | 2,990 | 56 | 1,288 | 43 | 41 | 6,310 | 5,375 | 85 | 2,890 | 54 | 1,309 | 45 | 43 |
| 25–34 | 8,821 | 6,654 | 75 | 3,420 | 51 | 1,201 | 35 | 34 | 8,437 | 6,395 | 76 | 3,167 | 50 | 1,136 | 36 | 35 |
| 35–44 | 8,365 | 5,402 | 65 | 2,523 | 47 | 777 | 31 | 29 | 7,544 | 4,940 | 65 | 2,140 | 43 | 644 | 30 | 28 |
| 45–54 | 6,437 | 3,836 | 60 | 1,635 | 43 | 435 | 27 | 24 | 6,097 | 3,641 | 60 | 1,462 | 40 | 401 | 27 | 24 |
| ≥55 | 2,884 | 1,571 | 54 | 629 | 40 | 138 | 22 | 19 | 2,881 | 1,601 | 56 | 605 | 38 | 131 | 22 | 19 |
| **Race/ethnicity** | | | | | | | | | | | | | | | | |
| American Indian/Alaska Native | 111 | 77 | 69 | 36 | 47 | 13 | 36 | 37 | 105 | 68 | 65 | 41 | 60 | 15 | 37 | 31 |
| Asian | 560 | 379 | 68 | 172 | 45 | 76 | 44 | 39 | 575 | 392 | 68 | 163 | 42 | 73 | 45 | 38 |
| Black/African American | 15,011 | 10,682 | 71 | 5,579 | 52 | 1,723 | 31 | 29 | 14,224 | 10,098 | 71 | 5,089 | 50 | 1,630 | 32 | 30 |
| Hispanic/Latino[f] | 7,709 | 5,066 | 66 | 2,431 | 48 | 859 | 35 | 32 | 7,272 | 4,943 | 68 | 2,182 | 44 | 809 | 37 | 34 |
| Native Hawaiian/Other Pacific Islander | 58 | 39 | 67 | 9 | 23 | 4 | 44 | 42 | 42 | 29 | 69 | 15 | 52 | 3 | 20 | 33 |
| White | 8,836 | 6,223 | 70 | 2,805 | 45 | 1,105 | 39 | 36 | 8,643 | 6,140 | 71 | 2,621 | 43 | 1,030 | 39 | 36 |
| Multiple races | 466 | 303 | 65 | 165 | 54 | 59 | 36 | 33 | 408 | 282 | 69 | 153 | 54 | 61 | 40 | 38 |
| **Transmission category** | | | | | | | | | | | | | | | | |
| **Male** | | | | | | | | | | | | | | | | |
| Male-to-male sexual contact | 15,552 | 11,362 | 73 | 5,746 | 51 | 2,255 | 39 | 35 | 15,340 | 11,435 | 75 | 5,500 | 48 | 2,195 | 40 | 36 |
| Injection drug use | 1,028 | 634 | 62 | 266 | 42 | 68 | 26 | 23 | 926 | 545 | 59 | 208 | 38 | 50 | 24 | 23 |
| Male-to-male sexual contact and injection drug use | 744 | 543 | 73 | 260 | 48 | 107 | 41 | 33 | 706 | 507 | 72 | 253 | 50 | 114 | 45 | 38 |
| Heterosexual contact[g] | 2,263 | 1,351 | 60 | 668 | 49 | 166 | 25 | 22 | 1,957 | 1,160 | 59 | 548 | 47 | 142 | 26 | 23 |
| Other[h] | 5,815 | 3,641 | 63 | 1,573 | 43 | 408 | 26 | 8 | 5,566 | 3,516 | 63 | 1,402 | 40 | 381 | 27 | 25 |
| **Subtotal** | 25,402 | 17,531 | 69 | 8,513 | 49 | 3,004 | 35 | 32 | 24,495 | 17,163 | 70 | 7,911 | 46 | 2,882 | 36 | 34 |
| **Female** | | | | | | | | | | | | | | | | |
| Injection drug use | 624 | 478 | 77 | 240 | 50 | 85 | 35 | 30 | 510 | 374 | 73 | 209 | 56 | 72 | 34 | 29 |
| Heterosexual contact[g] | 3,346 | 2,368 | 71 | 1,231 | 52 | 393 | 32 | 29 | 3,053 | 2,155 | 71 | 1,052 | 49 | 341 | 32 | 28 |
| Other[h] | 3,379 | 2,392 | 71 | 1,213 | 51 | 357 | 29 | 29 | 3,211 | 2,260 | 70 | 1,092 | 48 | 326 | 30 | 21 |
| **Subtotal** | 7,349 | 5,238 | 71 | 2,684 | 51 | 835 | 31 | 29 | 6,774 | 4,789 | 71 | 2,353 | 49 | 739 | 31 | 28 |
| **Total** | 32,751 | 22,769 | 70 | 11,197 | 49 | 3,839 | 34 | 32 | 31,269 | 21,952 | 70 | 10,264 | 47 | 3,621 | 35 | 33 |

*Note.* Estimated numbers resulted from statistical adjustment that accounted for reporting delays and missing transmission category, but not for incomplete reporting.

BED: BED HIV-1 capture enzyme immunoassay, named for the branched peptide sequences for HIV-1 subtypes B, E, and D used in the assay.

[a] Cases not diagnosed with Stage 3 HIV disease (AIDS) within six months after initial HIV diagnosis. (Cases diagnosed with Stage 3 HIV disease within six months of diagnosis of HIV infection are automatically categorized as long-standing infections for incidence estimation.)

[b] Percentage of reported diagnoses.

[c] Percentage of non-AIDS cases.

[d] Percentage of non-AIDS cases with available BED results.

[e] Percentage of non-AIDS cases, after multiple imputation to populate missing BED results.

[f] Hispanics/Latinos can be of any race.

[g] Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[h] Includes hemophilia, blood transfusion, perinatal exposure, and risk factor not reported or not identified.

**Table 7.** Diagnoses of HIV infection and HIV testing and antiretroviral use history, by year of diagnosis and selected characteristics, 2007–2010—18 states and 2 cities

| | 2007 | | | | | | | | 2008 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | With TTH[a] | | Repeat testers | | T[b] ≤12 mos. | | | | With TTH[a] | | Repeat testers | | T[b] ≤12 mos. | |
| | No. | No. | %[c] | No. | %[d] | No. | %[e] | Imp. %[f] | No. | No. | %[c] | No. | %[d] | No. | %[e] | Imp. %[f] |
| **Age at diagnosis (yr)** | | | | | | | | | | | | | | | | |
| 13–24 | 5,690 | 3,146 | 55 | 2,028 | 64 | 1,238 | 61 | 56 | 6,176 | 3,658 | 59 | 2,369 | 65 | 1,446 | 61 | 58 |
| 25–34 | 9,531 | 4,536 | 48 | 3,032 | 67 | 1,446 | 48 | 43 | 9,332 | 4,847 | 52 | 3,376 | 70 | 1,577 | 47 | 43 |
| 35–44 | 10,728 | 4,222 | 39 | 2,570 | 61 | 1,101 | 43 | 36 | 9,486 | 4,312 | 45 | 2,689 | 62 | 1,043 | 39 | 36 |
| 45–54 | 7,283 | 2,672 | 37 | 1,332 | 50 | 498 | 37 | 30 | 6,901 | 2,860 | 41 | 1,476 | 52 | 543 | 37 | 32 |
| ≥55 | 3,112 | 1,001 | 32 | 405 | 40 | 154 | 38 | 32 | 3,041 | 1,116 | 37 | 442 | 40 | 155 | 35 | 31 |
| **Race/ethnicity** | | | | | | | | | | | | | | | | |
| American Indian/Alaska Native | 120 | 46 | 38 | 35 | 76 | 20 | 57 | 41 | 126 | 50 | 40 | 30 | 60 | 14 | 47 | 40 |
| Asian | 643 | 229 | 36 | 141 | 62 | 61 | 43 | 43 | 642 | 296 | 46 | 181 | 61 | 95 | 52 | 46 |
| Black/African American | 15,883 | 7,369 | 46 | 4,126 | 56 | 1,886 | 46 | 39 | 16,008 | 8,027 | 50 | 4,612 | 57 | 2,107 | 46 | 41 |
| Hispanic/Latino[g] | 8,489 | 3,289 | 39 | 1,950 | 59 | 976 | 50 | 42 | 7,999 | 3,699 | 46 | 2,277 | 62 | 1,040 | 46 | 42 |
| Native Hawaiian/Other Pacific Islander | 49 | 24 | 49 | 12 | 50 | 5 | 42 | 43 | 50 | 20 | 40 | 17 | 85 | 10 | 59 | 51 |
| White | 10,550 | 4,342 | 41 | 2,942 | 68 | 1,405 | 48 | 40 | 9,573 | 4,438 | 46 | 3,065 | 69 | 1,413 | 46 | 41 |
| Multiple races | 610 | 278 | 46 | 161 | 58 | 84 | 52 | 42 | 538 | 263 | 49 | 170 | 65 | 85 | 50 | 44 |
| **Transmission category** | | | | | | | | | | | | | | | | |
| **Male** | | | | | | | | | | | | | | | | |
| Male-to-male sexual contact | 16,295 | 7,531 | 46 | 5,183 | 69 | 2,676 | 52 | 44 | 16,079 | 8,329 | 52 | 5,903 | 71 | 3,042 | 52 | 45 |
| Injection drug use | 1,721 | 627 | 36 | 334 | 53 | 138 | 41 | 35 | 1,301 | 538 | 41 | 286 | 53 | 115 | 40 | 36 |
| Male-to-male sexual contact and injection drug use | 1,091 | 530 | 49 | 393 | 74 | 198 | 50 | 43 | 884 | 470 | 53 | 332 | 71 | 147 | 44 | 41 |
| Heterosexual contact[h] | 2,566 | 1,198 | 47 | 526 | 44 | 221 | 42 | 35 | 2,496 | 1,186 | 48 | 530 | 45 | 192 | 36 | 35 |
| Other[i] | 5,859 | 1,756 | 30 | 726 | 41 | 283 | 39 | 29 | 5,873 | 2,169 | 37 | 888 | 41 | 322 | 36 | 20 |
| **Subtotal** | 27,532 | 11,642 | 42 | 7,162 | 62 | 3,516 | 49 | 42 | 26,633 | 12,692 | 48 | 7,939 | 63 | 3,818 | 48 | 43 |
| **Female** | | | | | | | | | | | | | | | | |
| Injection drug use | 916 | 418 | 46 | 286 | 68 | 130 | 45 | 34 | 771 | 380 | 49 | 259 | 68 | 119 | 46 | 35 |
| Heterosexual contact[h] | 4,289 | 2,019 | 47 | 1,183 | 59 | 526 | 44 | 34 | 4,043 | 2,068 | 51 | 1,272 | 62 | 513 | 40 | 35 |
| Other[i] | 3,607 | 1,498 | 42 | 736 | 49 | 265 | 36 | 40 | 3,489 | 1,653 | 47 | 882 | 53 | 314 | 36 | 42 |
| **Subtotal** | 8,812 | 3,935 | 45 | 2,205 | 56 | 921 | 42 | 34 | 8,303 | 4,101 | 49 | 2,413 | 59 | 946 | 39 | 35 |
| **Total** | **36,344** | **15,577** | **43** | **9,367** | **60** | **4,437** | **47** | **40** | **34,936** | **16,793** | **48** | **10,352** | **62** | **4,764** | **46** | **42** |

## Table 7. Diagnoses of HIV infection and HIV testing and antiretroviral use history, by year of diagnosis and selected characteristics, 2007–2010—18 states and 2 cities *(cont)*

| | 2009 | | | | | | | | 2010 | | | | | | | |
| | | With TTH[a] | | Repeat testers | | T[b] ≤12 mos. | | | | With TTH[a] | | Repeat testers | | T[b] ≤12 mos. | | |
| | No. | No. | %[c] | No. | %[d] | No. | %[e] | Imp. %[f] | No. | No. | %[c] | No. | %[d] | No. | %[e] | Imp. %[f] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Age at diagnosis (yr)** | | | | | | | | | | | | | | | | |
| 13–24 | 6,244 | 4,209 | 67 | 2,667 | 63 | 1,608 | 60 | 58 | 6,310 | 4,320 | 68 | 2,828 | 65 | 1,742 | 62 | 60 |
| 25–34 | 8,821 | 5,312 | 60 | 3,638 | 68 | 1,762 | 48 | 46 | 8,437 | 5,156 | 61 | 3,597 | 70 | 1,662 | 46 | 43 |
| 35–44 | 8,365 | 4,290 | 51 | 2,632 | 61 | 1,082 | 41 | 37 | 7,544 | 4,026 | 53 | 2,544 | 63 | 1,017 | 40 | 36 |
| 45–54 | 6,437 | 3,110 | 48 | 1,572 | 51 | 536 | 34 | 30 | 6,097 | 2,954 | 48 | 1,598 | 54 | 544 | 34 | 30 |
| ≥55 | 2,884 | 1,258 | 44 | 503 | 40 | 166 | 33 | 26 | 2,881 | 1,306 | 45 | 511 | 39 | 175 | 34 | 29 |
| **Race/ethnicity** | | | | | | | | | | | | | | | | |
| American Indian/Alaska Native | 111 | 56 | 50 | 31 | 55 | 12 | 39 | 40 | 105 | 65 | 62 | 39 | 60 | 14 | 36 | 32 |
| Asian | 560 | 259 | 46 | 165 | 64 | 81 | 49 | 44 | 575 | 317 | 55 | 190 | 60 | 104 | 55 | 47 |
| Black/African American | 15,011 | 8,641 | 58 | 4,910 | 57 | 2,240 | 46 | 42 | 14,224 | 8,299 | 58 | 4,901 | 59 | 2,203 | 45 | 41 |
| Hispanic/Latino[g] | 7,709 | 4,146 | 54 | 2,455 | 59 | 1,179 | 48 | 43 | 7,272 | 3,966 | 55 | 2,416 | 61 | 1,147 | 47 | 43 |
| Native Hawaiian/Other Pacific Islander | 58 | 27 | 47 | 15 | 56 | 5 | 33 | 35 | 42 | 24 | 57 | 21 | 88 | 9 | 43 | 44 |
| White | 8,836 | 4,767 | 54 | 3,263 | 68 | 1,556 | 48 | 42 | 8,643 | 4,830 | 56 | 3,350 | 69 | 1,576 | 47 | 42 |
| Multiple races | 466 | 283 | 61 | 173 | 61 | 81 | 47 | 42 | 408 | 261 | 64 | 161 | 62 | 87 | 54 | 49 |
| **Transmission category** | | | | | | | | | | | | | | | | |
| **Male** | | | | | | | | | | | | | | | | |
| Male-to-male sexual contact | 15,552 | 9,522 | 61 | 6,601 | 69 | 3,459 | 52 | 46 | 15,340 | 9,578 | 62 | 6,731 | 70 | 3,498 | 52 | 46 |
| Injection drug use | 1,028 | 476 | 46 | 256 | 54 | 90 | 35 | 33 | 926 | 416 | 45 | 200 | 48 | 72 | 36 | 34 |
| Male-to-male sexual contact and injection drug use | 744 | 444 | 60 | 332 | 75 | 171 | 52 | 45 | 706 | 495 | 70 | 356 | 72 | 180 | 51 | 44 |
| Heterosexual contact[h] | 2,263 | 1,230 | 54 | 556 | 45 | 205 | 37 | 34 | 1,957 | 1,053 | 54 | 548 | 52 | 193 | 35 | 32 |
| Other[i] | 5,815 | 2,459 | 42 | 1,033 | 42 | 392 | 38 | 24 | 5,566 | 2,415 | 43 | 1,057 | 44 | 362 | 34 | 22 |
| **Subtotal** | 25,402 | 14,131 | 56 | 8,778 | 62 | 4,317 | 49 | 44 | 24,495 | 13,957 | 57 | 8,892 | 64 | 4,305 | 48 | 44 |
| **Female** | | | | | | | | | | | | | | | | |
| Injection drug use | 624 | 355 | 57 | 215 | 61 | 96 | 45 | 36 | 510 | 325 | 64 | 211 | 65 | 94 | 45 | 35 |
| Heterosexual contact[h] | 3,346 | 1,894 | 57 | 1,106 | 58 | 433 | 39 | 33 | 3,053 | 1,732 | 57 | 1,047 | 60 | 409 | 39 | 34 |
| Other[i] | 3,379 | 1,799 | 53 | 913 | 51 | 308 | 34 | 23 | 3,211 | 1,748 | 54 | 928 | 53 | 332 | 36 | 38 |
| **Subtotal** | 7,349 | 4,048 | 55 | 2,234 | 55 | 837 | 37 | 34 | 6,774 | 3,805 | 56 | 2,186 | 57 | 835 | 38 | 34 |
| **Total** | **32,751** | **18,179** | **56** | **11,012** | **61** | **5,154** | **47** | **42** | **31,269** | **17,762** | **57** | **11,078** | **62** | **5,140** | **46** | **42** |

*Note.* Estimated numbers resulted from statistical adjustment that accounted for reporting delays and missing transmission category, but not for incomplete reporting.

[a] TTH = HIV testing and antiretroviral use history (Testing and Treatment History).

[b] T = Time between last negative HIV test (where available) and HIV infection diagnosis.

[c] Percentage of reported diagnoses.

[d] Percentage of cases with TTH information.

[e] Percentage of repeat testers.

[f] Percentage of reported diagnoses after multiple imputation to populate T.

[g] Hispanics//Latinos can be of any race.

[h] Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

[i] Includes hemophilia, blood transfusion, perinatal exposure, and risk factor not reported or not identified.